

THURSDAY, SEPTEMBER 21, 1899.

## ECLIPSES.

*The Indian Eclipse*, 1898. Edited by E. W. Maunder, F.R.A.S. Pp. xii + 172. (London: Hazell, Watson, and Viney, 1899.)

*The Story of Eclipses*. By G. F. Chambers, F.R.A.S. Pp. viii + 259. (London: George Newnes, 1899.)

NOTWITHSTANDING the fact that the totally eclipsed sun can only be observed for something like three hours in a century, an extensive literature dealing with the phenomena has come into existence. Two distinct branches of the subject may be recognised—one referring chiefly to past eclipses, which have their principal use in chronology, and the other bearing upon the more recent eclipses, in which attempts to extend our knowledge of the sun itself have taken the place of superstitious fear. Of the two books named above, the first belongs to the latter category, while the other is apparently intended to give a simple survey of the whole subject.

The first book forms the report of the two expeditions organised by the British Astronomical Association to observe the total eclipse of January 22, 1898, and gives an account of the objects and results of the observations made. The organisation of the expedition, combining science with pleasure, appears to have been in capable hands, and the Association is to be congratulated on the fact that some of those who took part in the observations gave the first place to science. Mr. Maunder's party at Talni was especially active, but Mr. Bacon's party appears to have arrived at Buxar too late to undertake anything very serious. The duplication of results, which inevitably followed from the fact that the eclipse was well visible to observers all along the line, to a certain extent reduces the value of the work at any particular station, each party probably being able to claim but little in the way of novel results which would not otherwise have been brought to light. Thus it is that the more specially valuable results of these expeditions are those obtained by Mr. Evershed and Mrs. Maunder—the former with the ultra-violet region of his photographs of the so-called "flash" and coronal spectra, and the latter indicating the best means of photographing the long extensions of the corona. Miscellaneous observations of the usual character are included in the report, as well as a chapter of hints for future work. No effort has been spared to make the report attractive; the general story of the expeditions forms very interesting reading, and the explanatory matter is very clear and concise, while the numerous illustrations from photographs—not all of scientific value, however—are beautifully reproduced. The chief scientific interest undoubtedly belongs to Mr. Evershed's fine photographs, taken with a very modest prismatic camera, and the full discussion of these will doubtless yield valuable results.

Mr. Chambers's book has been written primarily for the benefit of the English-speaking people who may expect to witness the phenomena of the total eclipse of May 28, 1900, in Spain or the United States. A very small part, however, is given to the information which seems to us what the average probable observer will desire to know

the greater part of the book being a sort of descriptive catalogue of eclipses, ancient and modern, including lunar eclipses. A complete want of proportion is, in fact, shown throughout; for instance, more than a dozen pages are taken up by an attempt to prove that the backward motion of the shadow on the dial of Ahaz was caused by a partial eclipse, while only two pages are given to the three important eclipses of 1893, 1896, and 1898. The author appears to have entirely failed to grasp the enormous advances which have lately been made, and leaves his readers in complete ignorance of the more important observations which now occupy the attention of astronomers during eclipses; thus, less than a single page is occupied by references to the spectroscope, and most of the statements made are now known to be erroneous. Finally, in his desire to satisfy the thirst for knowledge which it is one of the main objects of this series of books to create, the author refers almost entirely to works which comparatively few will be able to read, and quite omits to mention even the late Mr. Ranyard's classical compilation. The only redeeming features of the book, bearing in mind its more particular aim, are the thirty-three pages of matter describing the general phenomena of a total eclipse, and the appendix indicating how one may get to Spain or Portugal for the next eclipse.

## A FRENCH WRITER ON CLASSIFICATION.

*Aperçus de Taxinomie Générale*. Par J.-P. Durand (de Gros). Pp. 265. (Paris: Félix Alcan, 1899.)

EVERY scientific worker who takes in hand the task of classifying the objects of his study comes thereby into relation with the domain of logic and metaphysics. Whether this be done consciously or unconsciously, the classifier cannot avoid raising and dealing with questions which are the concern of philosophy as well as of physical science. The author of the book before us, starting from the position that all taxonomy (which form he prefers, on etymological grounds, to the more usual "taxonomy") must conform to logical requirements, proceeds to give a careful and elaborate analysis of the principles of logical division so far as they are involved in the classifications of science. To this he adds a free criticism, mainly from the logical point of view, of the labours of scientific taxonomists; and in the last place he furnishes some suggestions for the guidance of future workers in the same field. His preliminary analysis, if not very profound in its reasoning, is marked by the lucidity and good sense so constantly to be met with in writers of his nation. It does not add very much, except in clearness and fulness of treatment, to what is to be found in most standard works on logic, nor does it always avoid insisting at considerable length on the trite and obvious. This, however, evidently arises from the anxiety of the author to make himself thoroughly understood, and to allow no omission or ambiguity in the steps of his argument. He has certainly succeeded in expressing himself so clearly that whatever may be thought of his doctrine, no mistake can arise as to his meaning.

With regard to the critical portion of the work, it must be granted that most of the author's strictures are, from his own point of view, well founded. Nevertheless, it may be questioned whether the logical blots he contrives to hit

in the work of Mill, Littré, Bichat and others, have really the grave importance or have produced the disastrous results which he attributes to them. Mill's use of certain terms, such as "abstract" and "concrete general," is no doubt open to serious objection; but there is much likelihood that his conceptions on these points did not really differ from those of his critic; and the same *mutatis mutandis* may probably be said of the logical slips of Bichat and Haeckel. It would be unfair to accuse the author of pedantry, but at the same time it is not certain that he allows sufficiently for that faculty of the human mind which frequently leads it to conclusions practically sound by processes that are logically quite indefensible.

The constructive part of the book is hardly so strong as the critical. Here, however, M. Durand does excellent service in emphasising the point, even now imperfectly grasped by many systematists, that no classification of organisms can be really natural unless it proceeds on a phylogenetic basis. Where the phylogeny is unknown, a natural classification is so far impossible. In such cases an artificial classification, based on characters more or less arbitrarily selected, may be provisionally adopted as a substitute; and, so long as it is not treated as final, may answer all ordinary purposes without detriment to the advance of knowledge. From failure to recognise the practical value of such temporary expedients, M. Durand, as it seems to us, is led to adopt an unduly pessimistic tone with regard to the future of biological taxonomy. For a long time to come zoologists and botanists will doubtless have to proceed by the method of successive approximation; and even if the ideal result should be finally unattainable, enough will probably be gained to satisfy all demands but those of the logical purist.

M. Durand's able and acute commentary may be studied with profit by all who engage in taxinomic work themselves, or who wish to appreciate that of others. The most serious charge we have to bring against him is that of making scientific molehills into logical and metaphysical mountains.

F. A. D.

#### OUR BOOK SHELF.

*Die Welt als That. Umriss einer Weltansicht auf naturwissenschaftlichen Grundlage.* By J. Reinke. Pp. iv + 483. (Berlin: Gebrüder Paetel, 1899.)

IN this work Prof. Reinke sets forth his philosophic and scientific creed, his conceptions of nature and the universe, of plant, beast, man, and God. The book is divided into five parts. The first is entitled "Subject and Object of the Study of Nature," and discusses things and ideas, time and space, causality, chance, intelligence, and other metaphysical questions. The second part, under the heading of "The World-Stage," deals with the material universe and with the conceptions of matter, force and direction. The third part discusses "The Nature of Life," and in thirteen chapters treats of the cell, irritability, reproduction and heredity, adaptations, the origin of life, and kindred problems. In the fourth part, "Darwinism," the author, after giving an outline of the theory of natural selection and of the views of Nägeli and Weismann, states his own conclusions with regard to this subject. The fifth part, entitled "Natural Science and the Conception of God," discusses monism and dualism, theism, pantheism and atheism, and the first chapter of Genesis.

It is clear, from this brief summary of the contents of the book, that the field covered by it is a wide one. It must suffice here, therefore, to draw attention to the main results or conclusions reached by the author, which are in reality summed up in the last sentence of the book—"Im Anfang war die That"—"In the Beginning was the Deed." The solution to each and all of the great mysteries of science is to be found in the direct creative act of an intelligent being. One such act and deed created the material universe. A second gave rise to the first living organic substance, to protoplasm, where previously only the inorganic had existed. And a third act seems to be necessary to explain the origin of intelligence; "that matter thinks is certainly something other than that matter assimilates and breathes." These alleged creative acts are compared to the Days of Creation of the Mosaic Cosmogony, which the author considers "one of the greatest intellectual feats of history," combining both truth and poetry. As a proof of the greatness of Moses, the reader is referred to his statue at Rome by Michael Angelo, "since only one of the greatest of the mortal race of men could inspire the great artist of the Renaissance to such a work."

Prof. Reinke does not, it will be seen, arrive at very strikingly original conclusions, but it is something of a novelty to see a scientific man at the present day putting forward such propositions as the last message of science. He is frankly a dualist and considers monism "an exploded attempt to comprehend the world," the outcome of the natural effort of thinking man "to refer all explanations of things to the simplest possible principles." It is not, however, necessary to seek for unity; "the limit to be attained may just as well be duality, trinity, or a higher multiplicity." Dualism is "the ripe fruit of the studies set forth in this book." "In nature intelligent forces are to be distinguished as dominant from energetic forces as subservient; in organisms both are inseparably combined." Those who may wish for further information as to the processes of reasoning by which the author arrives at these conclusions must be referred to the work itself.

E. A. M.

*La Liquéfaction des Gaz: Méthodes nouvelles—Applications.* Par J. Cauro, Docteur ès Sciences. Pp. 83 (Paris: Gauthier-Villars, 1899.)

DR. CAURO'S book is good enough to make one wish it were better. Its chief faults are negative, and may be summed up in the words excessive concentration. When it is stated that within the limits of eighty pages the author gives an analysis of the theory of refrigeration and the changes of physical state involved, a description of the methods and apparatus of scientific investigators and of the machines employed in industrial work, a historical *résumé* of the progress of this branch of knowledge, and a review of the actual and possible applications of cold, it will be easily imagined that most of the work must be too sketchy to be of real use to any one. If refrigeration were recognised as a special subject in the examinations for some degree, Dr. Cauro's work is sufficiently accurate and up to date to make it a very good book for getting up the subject, though even from this point of view excessive brevity has led to some errors, as when the apparatus figured on p. 24 is described as a modification of that on p. 23, whereas it depends on a radically different process for attaining the same end. For popular reading, both the descriptive and the historical parts are too brief to be interesting, and are not even intelligible without more knowledge than such reading implies. Practical men of science, and practical makers of industrial machines, would have found the book very useful in reminding and suggesting, if every statement and description had been accompanied by full references to the original papers and other sources of information, so that those who are interested in any